PURGE SYSTEM FOR PRODUCT CONTAINER AND INTERFACE SEAL USED IN THE SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a product container for accommodating articles, such as semiconductors, panels for flat panel displays, or optical disks, which are produced in a high-cleanliness environment, during the production process thereof, and to a so-called load port for opening and closing such a product container. More specifically, the present invention relates to a purge system for substituting a gas sealed in a so-called FOUP (front-opening unified pod) accommodating articles as mentioned above, mainly semiconductor wafers with a diameter of 300 mm during their treatment. Further, the present invention also relates to a so-called interface seal (herein after referred to as a sealing member) used to connect an FOUP (front-opening unified pod) to a gas substitution system for substituting a gas sealed in the FOUP.

Related Background Art

Up to the present, in a semiconductor manufacturing process, the requisite high cleanliness for the process has been achieved by turning the

plant for performing various treatments on wafers into a cleanroom in its entirety. However, as wafers increase in diameter, this method of obtaining a high-cleanliness environment has come to involve a problem in terms of cost, and in recent years, a system has come to be adopted in which a minienvironment maintaining high cleanliness for each processing apparatus is ensured.

More specifically, in this system, instead of enhancing the cleanliness of the plant as a whole, high cleanliness is maintained during the production device only in the interior of respective processing apparatuses and in a storage container (hereinafter referred to as a pod) during transport between the respective processing apparatuses. As mentioned above, this pod is generally referred to as an FOUP. By thus adopting the so-called minienvironment system in which high cleanliness is achieved solely in small spaces, it is possible to achieve the same effect as in the case in which the entire plant is turned into a cleanroom, thus achieving a reduction in equipment investment and maintenance cost and realizing an efficient production process.

In the following, a semiconductor processing apparatus or the like that is actually used and in conformity with the so-called minienvironment system will be briefly described. Fig. 6 is a general view

of a semiconductor wafer processing apparatus 50. The semiconductor wafer processing apparatus 50 is mainly composed of a load port portion 51, a conveyance chamber 52, and a processing chamber 59. These components are separated from each other by a partition 55a and a cover 58a on the load port side and a partition 55b and a cover 58b on the process chamber side. In the conveyance chamber 52 of the semiconductor wafer processing apparatus 50, an airflow from above toward below is generated by a fan (not shown) provided in the upper portion thereof in order to discharge dust to maintain high cleanliness. Thus, dust is always discharged downwardly.

The load port portion 51 has a pod 2 installed on a stand 53, the pod 2 serving as a storage container for products such as silicon wafers (hereinafter simply referred to as wafers). As stated above, high cleanliness is maintained in the interior of the conveyance chamber 52 for processing of wafers 1, and, further, a robot arm 54 is provided therein. By this robot arm 54, the wafers are transferred between the interior of the pod 2 and the interior of the processing chamber 59. Usually, the processing chamber 59 contains various mechanisms for performing various treatments on the wafer surfaces, such as thin film formation and thin film processing. However, since these components are not directly

related to the present invention, a description thereof will be omitted.

The pod 2 has a space for containing the wafers 1 constituting the objects of treatment, and is equipped with a box-shaped main body portion 2a having an opening in one surface thereof and a cover 4 for tightly closing the opening. Inside the main body portion 2a, there is arranged a shelf with a plurality of stages for stacking the wafers 1 in one direction. The wafers 1 are arranged at fixed intervals and accommodated in the pod 2. In the example shown, the wafers 1 are stacked together in the vertical direction. An opening 10 is provided on the load port 51 side of the conveyance chamber 52. The opening 10 is situated such that it is opposed to the opening of the pod 2 when the pod 2 is arranged on the load port 51 so as to be close to the opening 10. Further, an opener (not shown) is provided inside the conveyance chamber 52 and in the vicinity of the opening 10. After the opener removes the cover 4 from the pod 2, the operation of carrying in or out the wafers 1 is conducted by the robot arm 54.

Fig. 7 is a sectional view schematically showing the construction of the stand 53 of Fig. 6 and the pod 2 placed thereon. In the lower portion of the pod 2, there are provided recesses 5, an intake port 7, and an exhaust port 9. Further,

provided on the surface of the stand 53 are positioning pins 12 adapted to be fitted into the recesses 5 to thereby regulate the installing position of the pod 2, a stand 53 side intake port 14 abutting the pod 2 side intake port 7, and a stand 53 side exhaust port 16 abutting the pod 2 side exhaust port 9. At the openings of the stand 53 side intake and exhaust ports 14 and 16, there are arranged sealing members 18 for enhancing the airtightness of these portions when these ports abut the pod 2 side ports. In the vicinity of the openings of the pod side intake and exhaust ports 7 and 9, there are arranged filter members 11, which prevent dust or the like from entering the pod 2 through these ports. Further, the stand 53 side intake port 14 and exhaust port 16 are respectively connected to a substitution gas supply source and a substitution gas exhaust source, constituting external devices, through check valves, flow meters, etc (not shown).

The above-described construction is schematically disclosed, for example, in Japanese Patent Application Laid-Open No. 2002-531934 or Japanese Patent Application Laid-Open No. 8-203993. Usually, the wafers 1 for which adhesion of dust or the like is restrained are brought into such a product accommodating pod 2, and its internal atmosphere is substituted by an inert gas such as

clean nitrogen, thereby restraining generation of chemical change such as natural oxidation or organic contamination on the wafer surfaces in the accommodated state. This substitution of the internal atmosphere is effected through the gas flow paths formed by the intake and exhaust ports provided in the pod 2 and the stand 53, with the pod 2 being placed on the stand 53. Thus, it is necessary to ensure, for the gas flow paths, a size large enough to allow flowing of a sufficient amount of substitution gas or internal atmosphere and a sufficient airtightness not to contaminate the substitution gas or the internal atmosphere. It is necessary for the sealing members 18 to ensure a sufficient sealing property meeting these demands.

It is to be noted that, apart from the connecting portion between an FOUP and a gas substitution system connected thereto, such sealing members are applicable to various other uses. However, when used for an FOUP, the sealing members are required to exhibit a stable sealing property particularly with respect to the ambient environment. Thus, in this specification, the sealing members will be described as applied, in particular, to a technique related to an FOUP.

Conventionally, as such a sealing member, a so-called packing with a ring-like configuration has

been used. Figs. 8A and 8B are schematic sectional views of a pod side exhaust (intake) port and a stand side exhaust (intake) ports using such packings. Fig. 8A shows a case in which there is used a so-called dome-shaped sealing member 18a with a curved inner surface configuration whose inner diameter decreases toward the upper opening. Fig. 8B shows a case in which there is used a so-called funnel-shaped sealing member 18b with a curved inner surface configuration whose inner diameter increases toward the upper opening.

When the pressure inside the packing, that is, the pressure on the gas flow path side, is higher than the pressure outside the packing, a pressure causing outward deformation of the dome configuration is applied to the sealing member 18a shown in Fig. 8A. This will occur, for example, when the sealing member 18a is used on the intake port side. In this case, a deforming pressure is imparted so as to bring the seal surface of the sealing member 18a into more intimate contact with the pod 2 side port end portion, with the result that the sealing property is further enhanced and becomes more stable. In contrast, when the pressure inside the packing is lower than the external pressure, that is, when, for example, the sealing member 18b is used on the exhaust port side, this difference in pressure results in imparting of a

deforming pressure that causes inward deformation of the dome configuration as indicated by the arrow in the drawing. As a result, the intimateness in contact between the seal surface of the sealing member 18a and the port end portion of the pod 2 deteriorates, resulting in, in extreme cases, generation of a gap or the like.

When the pressure inside the packing is lower than the pressure outside the packing, a pressure causing inward deformation of the funnel shape is applied to the sealing member 18b shown in Fig. 8B. This will occur, for example, when the sealing member 18b is used on the exhaust port side. In this case, deformation pressure is imparted so as to bring the seal surface of the sealing member 18b into more intimate contact with the pod 2 side port end portion, with the result that the sealing property is enhanced and stabilized. In contrast, when the pressure inside the packing is higher than the pressure outside the packing, that is, when, for example, the sealing member is used on the intake port side, this difference in pressure results in application of deforming pressure causing outward deformation of the funnel configuration as indicated by the arrow in the drawing. As a result, the intimateness in contact between the seal surface of the sealing member 18b and the port end portion of the pod 2 deteriorates,

resulting in, in extreme cases, generation of a gap or the like.

Thus, it is difficult for the dome-shaped sealing member and the funnel-shaped sealing member to be commonly used, and it is necessary to use them selectively according to whether the environment to be sealed is under positive pressure or negative pressure. Further, generally speaking, the environment to be sealed by these sealing members is subject to change in pressure, so that the sealing property of each seal changes as the ambient pressure changes. Thus, to ensure a fixed sealing property, it is necessary to apply beforehand a crushing load to the sealing members to impart deformation thereto to a fixed degree or more. In this case, it is necessary to apply a great load, so that as deformation is repeatedly effected, the sealing members undergo plastic deformation, resulting in an increase in the frequency with which the sealing members are replaced. At the same time, to uniformly deform these sealing members to ensure a satisfactory sealing property, it is necessary to maintain a fixed surface precision on the pod side, the stand side, and, further, on the seal surfaces of the sealing members, resulting in an increase in machining cost for these members.

Japanese Patent Application Laid-Open No.

2002-510150, US Patent No. 6164664, and US Patent No. 5988233 disclose a grommet of a curved-dome shape or a bellows type sealing member for preventing plastic deformation due to such repeated load application. Such configurations seem to provide a satisfactory effect from the viewpoint of preventing plastic deformation. However, they are deemed to be incapable of providing a particular effect with respect to the problem to be solved by the present invention, that is, change in sealing property due to pressure change in the in-seal environment.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above problem in the prior art. It is an object of the present invention to provide a sealing member capable of exhibiting a satisfactory sealing property independently of changes in the positive pressure, negative pressure, etc. in the in-seal environment and a purge system using such a sealing member. Further, the present invention aims to provide a sealing member capable of exhibiting a satisfactory sealing property without involving a large deformation load causing excessive deformation of the sealing member or having to meet a strict demand regarding seal surface precision, and a purge system using such a sealing member.

In order to solve the above problem, according to the present invention, there is provided a purge system for a product container in which a container-side port formed in the product container and a stand-side port formed in a stand on which the container is placed are substantially in contact with each other via a sealing member, and a gas line for performing at least one of gas supply and evacuation with respect to an interior of the container is formed between the stand-side port and the container-side port, characterized in that the sealing member has: a ring-shaped main body portion to be fixed to an opening end portion of a stand-side port opening so as to surround an outer periphery of the stand-side port opening; a first lip portion substantially extending from an inner peripheral portion of the ring-shaped main body portion toward the other opening end portion different from the opening end portion where the main body portion is fixed; a second lip portion substantially extending from an outer peripheral portion of the ring-shaped main body portion toward the other opening end portion different from the opening end portion where the main body portion is fixed; and a hole provided in the main body portion between the first lip portion and the second lip portion so as to extend to an end surface where the first lip portion and the second

lip portion are not formed, and that the stand has a gas flow path communicating with the hole and connected to an exhaust system.

Note that, in the above system, the first lip portion and the second lip portion are preferably adapted to be deformed in directions which are different from each other and in which the first lip portion and the second lip portion respectively extend, according to a pressure in a space insulated from an ambient environment by the sealing member.

Further, in order to solve the above problem, according to the present invention, there is provided a purge system for a product container in which a container-side port formed in the product container and a stand-side port formed in a stand on which the container is placed are substantially in contact with each other via a sealing member, and a gas line for performing at least one of gas supply and evacuation with respect to an interior of the container is formed between the stand-side port and the container-side port, characterized in that the sealing member has: a ring-shaped main body portion to be fixed to an opening end portion of a container-side port opening so as to surround an outer periphery of the opening; a first lip portion substantially extending from an inner peripheral portion of the ring-shaped main body portion toward the other opening end

portion different from the opening end portion where the main body portion is fixed; and a second lip portion substantially extending from an outer peripheral portion of the ring-shaped main body portion toward the other opening end portion different from the opening end portion where the main body portion is fixed, and that the stand has a gas flow path which communicates with a portion formed between the first lip portion and the second lip portion when the stand-side port and the container-side port are held in contact with each other and which is connected to an exhaust system.

Note that, in the above system, the first lip portion and the second lip portion are adapted to be deformed in directions which are different from each other and in which the first lip portion and the second lip portion respectively extend, according to a pressure in a space insulated from an ambient environment by the sealing member.

It is to be noted that the above-mentioned products, container, and stand respectively correspond to the wafer, pod, and opener stand in the following embodiments. Further, the first lip portion and the second lip portion respectively correspond to the inner peripheral lip and the outer peripheral lip in the following embodiments.

In order to solve the above problem, according

to the present invention, there is provided a sealing member which, when connecting together a first space and a second space which are insulated from an ambient environment, which are capable of maintaining an internal pressure different from a pressure of the ambient environment, and which each have an opening, is arranged between an opening-forming surface of the first space and an opening-forming surface of the second space to thereby insulate the first space and the second space from the ambient environment, the sealing member including: a ring-shaped main body portion to be fixed to one of the opening-forming surface of the first space and the opening-forming surface of the second space so as to surround an outer periphery of the opening; a first lip portion substantially extending from an inner peripheral portion of the ring-shaped main body portion toward the other opening-forming surface different from the opening-forming surface where the main body portion is fixed; and a second lip portion substantially extending from an outer peripheral portion of the ring-shaped main body portion toward the other opening-forming surface different from the opening-forming surface where the main body portion is fixed, the sealing member being characterized in that the first lip portion and the second lip portion are adapted to be deformed in directions which are

different from each other and in which the first lip portion and the second lip portion respectively extend, according to pressures in the first space and the second space.

Note that, in the above-mentioned sealing member, the main body portion preferably has a hole provided between the first lip portion and the second lip portion so as to extend to an end surface where the first lip portion and the second lip portion are not formed.

Further, in the above-described sealing member, the first lip portion has a configuration whose inner diameter gradually diminishes as the first lip portion is departed from the main body portion, and wherein the second lip portion has a configuration whose inner diameter gradually increases as the second lip portion is departed from the main body portion.

Further, in order to solve the above problem, according to the present invention, there is provided a sealing member which, when connecting together a first space and a second space which are insulated from an ambient environment, which are capable of maintaining an internal pressure different from a pressure of the ambient environment, and which each have an opening, is arranged between an opening-forming surface of the first space and an

opening-forming surface of the second space to thereby insulate the first space and the second space from the ambient environment, the sealing member including: a ring-shaped main body portion to be fixed to one of the opening-forming surface of the first space and the opening-forming surface of the second space so as to surround an outer periphery of the opening; a first lip portion substantially extending from an inner peripheral portion of the ring-shaped main body portion toward the other opening-forming surface different from the opening-forming surface where the main body portion is fixed; and a second lip portion substantially extending from an outer peripheral portion of the ring-shaped main body portion toward the other opening-forming surface different from the opening-forming surface where the main body portion is fixed, the sealing member being characterized in that the main body portion has a hole provided between the first lip portion and the second lip portion so as to extend to an end surface where the first lip portion and the second lip portion are not formed.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view, partly in section, of a sealing member according to the present invention;

Fig. 2 is a sectional view of the sealing member of Fig. 1;

Fig. 3 is a schematic perspective view of a system according to a first embodiment of the present invention, showing the sealing member of Fig. 1 as installed on the stand of an FOUP load port;

Fig. 4 is a schematic sectional view of the stand of Fig. 3 with an FOUP arranged thereon;

Fig. 5 is a schematic sectional view of the stand of Fig. 3 with an FOUP arranged thereon;

Fig. 6 is an overall schematic side view of a general semiconductor wafer processing apparatus to which the present invention and the prior-art technique are applicable;

Fig. 7 is a schematic sectional view of the stand of an FOUP load port using conventional sealing members, with an FOUP placed thereon;

Fig. 8A is a schematic sectional view of an intake/exhaust port end portion of a stand using a conventional system, that is, a conventional sealing member, and an intake/exhaust port end portion of an opposing pod;

Fig. 8B is a schematic sectional view of an intake/exhaust port end portion of a stand using a conventional system, that is, a conventional sealing member, and an intake/exhaust port end portion of an opposing pod;

Fig. 9 is a schematic sectional view corresponding to Fig. 4 which shows the first embodiment, showing a system according to a second embodiment of the present invention; and

Fig. 10 is a schematic diagram showing a system to which the sealing members of the present invention are suitably applied.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The first embodiment of the present invention will now be described with reference to the drawings. Fig. 1 is a perspective view, partly in section, of a sealing member suitably applicable to a system according to the present invention, and Fig. 2 is a sectional view of the sealing member of Fig. 1, taken along the line 2-2. A sealing member 20 used in a system according to the present invention has a double seal structure, and is composed of a main body portion 20a formed substantially in a ring-like configuration, an inner peripheral lip 20b formed on the inner peripheral side of an end surface of the main body portion 20a, and an outer peripheral lip 20c formed on the outer peripheral side of the end surface at which the inner peripheral lip 20b is formed. Further, between the inner peripheral lip 20b and the outer peripheral lip 20c of the main body portion 20a, there are formed a plurality of suction

holes 20d extending from one end surface to the other end surface of the main body portion 20a.

The inner peripheral lip 20b has a dome-like configuration with respect to the central axis of the sealing member 20, gradually decreasing in inner diameter as it extends upwards. In contrast, the outer peripheral lip 20c has a funnel-like configuration with respect to the central axis of the sealing member 20, gradually increasing in inner diameter as it extends upwards. Due to this construction, when positive pressure is maintained in the in-seal environment, the dome-shaped inner peripheral lip 20b suitably provides a sealing effect, and, when negative pressure is maintained in the in-seal environment, the funnel-shaped outer peripheral lip 20c suitably provides a sealing effect, so that it is possible to obtain a satisfactory sealing property independently of the pressure in the in-seal environment. Further, the two different lips perform different operations, so that even when the seal surface precision is low or when the load for crushing the sealing member is small, it is possible to obtain a satisfactory sealing property.

Further, as stated above, the sealing member 20 of this embodiment is equipped with the suction holes 20d. Due to the intermediation of the suction holes 20d, when the inner peripheral lip 20b and the outer

peripheral lip 20c abut the pod side port end, it is possible to evacuate the space defined by the inner peripheral lip 20b, the outer peripheral lip 20c, and the port end. Due to this evacuating operation, it is possible for the sealing member 20 to be more firmly attached to the pod side port end, thereby achieving a further improvement in terms of sealing property. Further, through this operation, even if the seal surface precision is low or if the load for crushing the sealing member is small, the sealing member itself actively provides a sealing effect, thereby making it possible to obtain a satisfactory sealing property.

While in this example, suction holes are provided in the sealing member, it is also possible to adopt a construction which has no such suction holes and which has solely the plurality of lips. While in this example, the lips of the double seal are respectively formed in a dome-like and a funnel-like configuration, this should not be construed restrictively. The same effect can be obtained as long as configurations are adopted which cause deformation of the lips in different directions according to the pressure in the in-seal environment. Further, even when the lips are formed in the same configuration, it is possible to obtain the effect of enhancing the intimateness in contact between the

sealing members and port ends by providing between the plurality of lips a construction having the same effect as the suction holes of this embodiment.

An actual system using sealing members according to the present invention will be briefly described with reference to the relevant drawing. Fig. 10 shows such a system which is composed of a first space 31 and a second space 41 insulated from the ambient space. Connected to the first space 31 are a first gas introduction system 32 used to increase the internal pressure thereof and a first exhaust system 33 used to lower the internal pressure thereof. Similarly, also connected to the second space 41 are a second gas introduction system 42 used to increase the internal pressure thereof and a second exhaust system 43 used to lower the internal pressure thereof. The first space 31 has an opening 35 in an opening-forming surface 31a, and the second space 41 has an opening 45 in an opening-forming surface 41a.

A sealing member 20 according to the present invention is arranged between the two openings 35 and 45, and is suitably used to insulate the system from the ambient atmosphere. Further, although not shown, it is also possible to provide, separately from the gas introduction systems and the exhaust systems annexed to the first and second spaces, a system

connected to the suction holes 20d of the sealing member 20 of the present invention. Further, the sealing member of the present invention can also be suitably used in various modifications of the first and second spaces, e.g., a construction in which the first space has no gas introduction system or exhaust system and in which second system has solely an exhaust system.

(First Embodiment)

Next, with reference to the drawings, a case will be described in which a system according the first embodiment using a sealing member according to the present invention is applied to a system related to an FOUP in use at present. It is to be noted that the semiconductor wafer processing apparatus and the pod to which the present invention is applied are substantially the same in construction as the conventional ones described above, so that a redundant description thereof will be omitted. Further, regarding the mechanism for opening and closing the cover 4 of the pod 2 such as an opener, it is not directly pertinent to the present invention, so that the description of the related-art technique will be applied, and a detailed description thereof will be omitted.

Fig. 3 is a schematic perspective view of the stand 53. Provided on the surface of the stand 53

are positioning pins 12, an intake port 14, and an exhaust port 16. Seal members 20 according to the present invention are arranged in the openings of the intake and exhaust ports 14 and 16. Figs. 4 and 5 are schematic sectional views showing the construction of the stand 53, etc. and the pod 2 placed thereon; Fig. 4 shows the state immediately before the placing of the pod 2, and Fig. 5 shows the state in which the pod 2 has been placed. In this embodiment, there are provided inside the stand 53 suction lines 19 for reducing the pressure in the spaces formed between the sealing members 20 and the intake and exhaust port end portions. The suction lines 19 communicate with the above-mentioned spaces through the suction holes 20d, and are connected to an evacuation system (not shown), which is an external apparatus.

In the following, with reference to the drawings, the purge operation, etc. in an FOUP system to which the present invention is applied will be described. First, the pod 2 which accommodates semiconductor wafers 1 in its interior and which is hermetically closed by the cover 4 is conveyed to a position above the stand 53. The pod 2 is placed on the stand 53, with the positioning pins 12 protruding from the stand 53 being substantially fitted into the recesses 5 provided in the lower portion of the pod 2.

In this state, the intake port 7 and the exhaust port 9 on the pod side abut the intake port 14 and the exhaust port 16 on the stand 53 side through the intermediation of the sealing members 20.

Here, using the suction lines 19, the operation of evacuating the interior of the spaces 20e formed between the sealing members 20 and the intake and exhaust port ends on the pod 2 side is conducted. Through the operation, the pressure in the spaces 20e is reduced, and the sealing members 20 are firmly attached to the intake and exhaust port ends on the abutting pod 2 side by the effect of the spaces 20e whose pressure has been reduced. After the completion of the operation, or while the operation is being continued, purging operation is performed on the interior of the pod 2. In the purging operation, a substitution gas is caused to circulated in the following order: the intake port 14 on the stand 53 side, the sealing member 20, the intake port 7 on the pod 2 side, the filter 11, the interior of the pod 2, the filter 11, the exhaust port 9 on the pod 2 side, the sealing member 20, and the exhaust port 16 on the stand 53 side, whereby the atmosphere in the pod 2 is substituted.

By applying the system of this embodiment to a load port as stated above, it is possible for the intake line and the exhaust line to maintain a given

condition while maintaining a sufficient sealing property with respect to the external environment independently of whether it is positive pressure or negative pressure that is maintained in these lines. Thus, it is possible, for example, to supply substitution gas to the interior of the pod 2 at higher flow velocity as compared with the related art, thus making it possible to perform atmosphere substitution more effectively. Further, by monitoring the internal pressure of the press-reduced spaces 20e through the intake line 19, it is also possible to monitor the sealing condition of the sealing members 20.

In this embodiment, there are employed the stand 53 with only one intake port system and one exhaust port system and the pod 2 corresponding thereto. However, the construction allowing application of the present invention is not restricted to the above-described one; it is desirable to increase or decrease their number as appropriate taking into account the required gas substitution speed, the content of the pod 2, etc. Further, it is also possible to adopt a construction using intake ports only. In this case, substitution gas is supplied into the pod through the ports, and the pressure inside the pod is made higher than the ambient atmospheric pressure, decreasing the sealing

force between the cover 4 and the pod main body 2a. In this way, the inner atmosphere of the pod 2 is caused to flow out through the gap between the cover 4 and the pod main body 2a which is generated as a result of the reduction in sealing force, thereby effecting evacuation of the interior of the pod.

(Second Embodiment)

While in the first embodiment described above the sealing members are arranged on the stand side, this should not be construed restrictively; it is also possible for the sealing members to be arranged on the pod side. In this case, instead of providing suction holes in the sealing members, it is possible to connect, to the portion of the seal surface on the stand side which is in contact with the space formed between the inner peripheral lip and the outer peripheral lip, an exhaust system for evacuating the interior of the space. Further, while this example is described as applied to an FOUP, the application of the present invention is not restricted to such a system. The sealing member of the present invention can be applied to any system as long as it is a system which has a container accommodating a plurality of objects and a conveyance chamber for carrying the objects from the container to convey them to an apparatus for processing the objects and which requires purging of the atmosphere inside the

container.

The second embodiment of the present invention will be described in detail with reference to the drawings as applied to a case as mentioned above. Fig. 9 is a drawing showing the second embodiment, and corresponds to Fig. 4, which was referred to in describing the first embodiment. In the drawing, the components having functions similar to those of the corresponding components of the first embodiment will be indicated by the same reference numerals. In this embodiment, no suction holes 20d are provided in the sealing members 20; instead, connected to the portions of the seal surfaces on the stand side in contact with the spaces formed between the inner peripheral lips 20b and the outer peripheral lips 20c, are exhaust systems 19 for evacuating the interior of the spaces. In this embodiment also, the interior of the spaces formed between the two kinds of lips is reduced in pressure by the exhaust systems 19, whereby it is possible for the intake line and the exhaust line to maintain a given condition while maintaining a sufficient sealing property with respect to the external environment independently of whether it is positive pressure or negative pressure that is maintained in the intake and exhaust lines.

While the systems of the first and second embodiments have been described as applied to an FOUP,

this should not be construed restrictively. The present invention can be applied to any system as long as it is a system which has a container accommodating a plurality of objects and a conveyance chamber for carrying the objects from the container to convey them to an apparatus for processing the objects and which requires purging of the atmosphere inside the container.

The sealing member of the present invention is characterized by a plurality of lips which are deformed in different directions by a pressure applied to the lip inner peripheral portion. Due to this construction, it is possible to obtain a superior sealing property without involving excessive deformation of the lips due to large load or a high level of surface precision for the seal surface and the surface opposed thereto. Further, it is possible to obtain a superior sealing property independently of whether the pressure in the space insulated from the exterior by the sealing member is positive pressure or negative pressure with respect to the external pressure.

Further, this sealing member has a main body portion, a plurality of lips, and a space formed between them and the seal surface of the member opposed thereto and, further, a suction hole for evacuating the interior of the space. Due to this

construction, the interior of the above-mentioned space is evacuated to more firmly attach the sealing member to the seal surface opposed thereto, thereby achieving a superior sealing property. Thus, the seal surface of the sealing member and the seal surface of the opposing member are brought into close contact with each other by physical attraction, whereby even if the surface precision required of these seal surfaces is of a lower level than the surface precision required of the conventional seal surfaces, such a relatively low level of surface precision is permissible. Further, by monitoring the pressure in the interior of the space, it is also possible to check the sealing condition.